

REMARKS

Claims 1 and 3-27 are all of the claims presently pending in the application. Claims 1, 7, 24 and 27 have been amended to more particularly define the invention. Claim 2 has been canceled without prejudice or disclaimer.

It is noted that the claim amendments are made only for more particularly pointing out the invention, and not for distinguishing the invention over the prior art, narrowing the claims or for any statutory requirements of patentability. Further, Applicants specifically state that no amendment to any claim herein should be construed as a disclaimer of any interest in or right to an equivalent of any element or feature of the amended claim.

Claims 1-3, 10, 14-18, and 24-27 stand rejected under 35 U.S.C. § 102(a) as being anticipated by Tadayon et al. (U.S. Patent No. 6,574,963) (hereinafter "Tadayon"). Claims 4-6 and 20-23 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Tadayon in view of Thiesen et al. (U.S. Patent No. 6,595,006) (hereinafter "Thiesen") or, as an alternative, Chrysler et al. (U.S. Patent No. 5,303,555) (hereinafter "Chrysler") or Hill (U.S. Patent No. 5,924,305). Claims 11-13 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Tadayon. Claims 7-8 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Tadayon in view of Maeda et al. (U.S. Patent No. 6,799,282) (hereinafter "Maeda").

These rejections are respectfully traversed in the following discussion.

I. THE CLAIMED INVENTION

The claimed invention (e.g., as defined by exemplary claim 1) is directed to an assembly including at least one microprocessor.

The microprocessor includes means for recycling heat generated by at least one microprocessor to energy, and means for directing the heat from the at least one microprocessor to the means for recycling heat. The energy is used for cooling the at least one microprocessor.

In conventional systems for cooling computer chips, heat is removed from a computer chip by solid state conduction through a cooling unit. For example, a chip is in contact with the cooling unit through a thermal interface material. A heat sink then spreads the heat over a

large area and a fan removes the heat by blowing it. The energy for driving the fan is obtained from an external source, thereby increasing the power consumption of the computer system.

The claimed invention of exemplary claim 1, on the other hand, provides an assembly including at least one microprocessor that includes means for recycling heat generated by at least one microprocessor to energy, wherein the energy is used for cooling the at least one microprocessor (e.g., see Application at page 3, lines 14-20). The claimed invention provides an assembly that suitably improves the power efficiencies of computer systems (see Application at page 3, lines 10-13).

II. THE 35 USC §112, FIRST PARAGRAPH REJECTION

Claim 9 stands rejected under 35 U.S.C. § 112, first paragraph. Specifically, the Examiner states that the “means for recycling heat by a chemical reaction has not been disclosed in the specification”. Applicants respectfully submit that the Applicant provides as an example for a means for energy-recycling of the heat that “the heat from the chip can drive a chemical reaction, which is used to store energy”. Applicants respectfully submit that the claim limitation of claim 9 is clearly disclosed in the specification.

In view of the foregoing, reconsideration and withdrawal of the §112, first paragraph rejection is respectfully requested.

III. THE PRIOR ART REFERENCES

A. The Tadayon Reference

The Examiner alleges that Tadayon teaches the claimed invention of claims 1-3, 10, 14-18, and 24-27. Furthermore, the Examiner alleges that the claimed invention of claims 11-13 would have been obvious in view of Tadayon. Applicants submit, however, that there are elements of the claimed invention which are neither taught nor suggested by Tadayon.

That is, Tadayon does not teach or suggest an assembly including at least one microprocessor “*wherein said energy is used for cooling said at least one microprocessor*” as recited in claim 1 and similarly recited in claims 24 and 27.

The Examiner does not point out the specific portions of Tadayon on which he relies to support his allegations. The Examiner merely relies upon the entire disclosure of Tadayon and has pointed out certain reference numbers that allegedly correspond to certain features of the claimed invention to support his allegations. The Examiner, however, is clearly incorrect.

That is, nowhere does Tadayon teach or suggest an assembly including at least one microprocessor that includes means for recycling heat generated by at least one microprocessor to energy, wherein the energy is used for cooling the at least one microprocessor. Indeed, the Examiner does not even specifically allege that Tadayon teaches or suggests this feature.

Tadayon merely discloses an electrical energy-generating heat sink system that provides a method for continuously recharging an energy storage device in electronic devices.

In contrast, the claimed invention uses recycled heat for cooling the microprocessor chip. This allows the assembly, in some cases, to avoid converting mechanical energy into electrical energy, as is suggested by Tadayon. This is an advantage of the claimed invention because energy conversion causes large losses.

Additionally, as is described in the Application, because the claimed invention uses the heat for cooling the chip, the claimed invention provides a feedback mechanism. Specifically, the energy W_c can be used for other purposes, such as to drive a generator producing electric energy, which is fed back into an electrical power grid, as defined by dependent claim 3.

Furthermore, because the recycled heat is used to cool the microprocessor chip, less external work is required to cool the chip, thereby resulting in less power consumption for the computer system. With this feedback mechanism, as the chip generates more heat, more cooling is provided to the chip (see Application at page 6, line 21 through page 7, line 12). The feedback mechanism is more efficient than the system taught in Tadayon. That is, Tadayon is storing the energy electrically in the battery. There are large energy losses associated with this function. In contrast, the claimed invention teaches using the energy instantaneously in another area of the computer system.

This feature is clearly not taught or suggested in Tadayon. However, if the Examiner wishes to maintain this rejection, Applicants respectfully request the Examiner to specifically point out the support in Tadayon for the Examiner's allegation.

Moreover, Tadayon does not teach or suggest “*wherein said energy is used to supply an electric power grid*” as recited in dependent claim 3.

That is, the claimed invention teaches using the energy in an alternative area. In contrast, Tadayon merely teaches storing the generated energy in a local battery.

Therefore, Applicant submits that there are elements of the claimed invention that are not taught or suggest by Tadayon. Therefore, the Examiner is respectfully requested to withdraw this rejection.

B. The Thiesen Reference

The Examiner alleges that Thiesen would have been combined with Tadayon to teach the claimed invention of claims 4-6 and 20-23. Applicants submit, however, that even if combined, the alleged combination would not teach or suggest each and every feature of the claimed invention.

That is, neither Tadayon nor Thiesen, nor any combination thereof, teaches or suggests an assembly including at least one microprocessor “*wherein said energy is used for cooling said at least one microprocessor*” as recited in claim 1.

The Examiner attempts to rely on the abstract of Thiesen to support his allegations. The Examiner, however, is clearly incorrect.

That is, nowhere in the abstract (nor anywhere else for that matter) does Thiesen teach or suggest an assembly including at least one microprocessor that includes means for recycling heat generated by at least one microprocessor to energy, wherein the energy is used for cooling the at least one microprocessor. Indeed, the Examiner does not even allege that Thiesen teaches or suggests this feature. In fact, the Examiner merely alleges that Thiesen discloses that a heat engine may be used for cooling and power generation.

Therefore, Thiesen clearly does not make-up the deficiencies of Tadayon.

Therefore, Applicants submit that even if combined, the alleged combination of references does not teach or suggest each and every feature of the claimed invention. Therefore, the Examiner is respectfully requested to withdraw this rejection.

C. The Chrysler Reference

The Examiner alleges that Chrysler would have been combined with Tadayon to teach the claimed invention of claims 4-6 and 20-23. Applicants submit, however, that even if combined, the alleged combination would not teach or suggest each and every feature of the claimed invention.

That is, neither Tadayon nor Chrysler, nor any combination thereof, teaches or suggests an assembly including at least one microprocessor “*wherein said energy is used for cooling said at least one microprocessor*” as recited in claim 1.

The Examiner does not provide specific support in Chrysler, but merely cites the entire reference of Chrysler to support his allegations. The Examiner, however, is clearly incorrect.

That is, nowhere does Chrysler teach or suggest an assembly including at least one microprocessor that includes means for recycling heat generated by at least one microprocessor to energy, wherein the energy is used for cooling the at least one microprocessor. Indeed, the Examiner does not even allege that Chrysler teaches or suggests this feature. In fact, the Examiner merely alleges that Chrysler discloses that a heat engine may be used for cooling and power generation.

Therefore, Chrysler clearly does not make-up the deficiencies of Tadayon.

Therefore, Applicants submit that even if combined, the alleged combination of references does not teach or suggest each and every feature of the claimed invention. Therefore, the Examiner is respectfully requested to withdraw this rejection.

D. The Hill Reference

The Examiner alleges that Hill would have been combined with Tadayon to teach the claimed invention of claims 4-6 and 20-23. Applicants submit, however, that even if combined, the alleged combination would not teach or suggest each and every feature of the claimed invention.

That is, neither Tadayon nor Hill, nor any combination thereof, teaches or suggests an assembly including at least one microprocessor “*wherein said energy is used for cooling said at least one microprocessor*” as recited in claim 1.

The Examiner does not provide specific support in Hill, but merely cites the entire reference of Hill to support his allegations. The Examiner, however, is clearly incorrect.

That is, nowhere does Hill teach or suggest an assembly including at least one microprocessor that includes means for recycling heat generated by at least one microprocessor to energy, wherein the energy is used for cooling the at least one microprocessor. Indeed, the Examiner does not even allege that Hill teaches or suggests this feature. In fact, the Examiner merely alleges that Hill discloses that a heat engine may be used for cooling and power generation.

Therefore, Hill clearly does not make-up the deficiencies of Tadayon.

Therefore, Applicants submit that even if combined, the alleged combination of references does not teach or suggest each and every feature of the claimed invention. Therefore, the Examiner is respectfully requested to withdraw this rejection.

E. The Maeda Reference

The Examiner alleges that Maeda would have been combined with Tadayon to teach the claimed invention of claims 7 and 8. Applicants submit, however, that even if combined, the alleged combination would not teach or suggest each and every feature of the claimed invention.

That is, neither Tadayon nor Maeda, nor any combination thereof, teaches or suggests an assembly including at least one microprocessor “*wherein said energy is used for cooling said at least one microprocessor*” as recited in claim 1.

The Examiner does not provide specific support in Maeda, but merely cites the entire reference of Maeda to support his allegations. The Examiner, however, is clearly incorrect. The Examiner, however, is clearly incorrect.

That is, nowhere in the abstract (nor anywhere else for that matter) does Maeda teach or suggest an assembly including at least one microprocessor that includes means for recycling heat generated by at least one microprocessor to energy, wherein the energy is used for cooling the at least one microprocessor. Indeed, the Examiner does not even allege that Maeda teaches or suggests this feature. In fact, the Examiner merely alleges that Maeda discloses a thermoelectric circuit as means to convert thermal energy to electrical energy including an array of thermocouples.

Therefore, Maeda clearly does not make-up the deficiencies of Tadayon.

Therefore, Applicants submit that even if combined, the alleged combination of references does not teach or suggest each and every feature of the claimed invention. Therefore, the Examiner is respectfully requested to withdraw this rejection.

IV. FORMAL MATTERS AND CONCLUSION

In response to Examiner's objections, the drawings have been amended in a manner believed fully responsive to all points raised by the Examiner.

In response to Examiner's objections to the Drawings, Applicants file herewith annotated and replacement sheets for Figures 1B and 1C, deleting the term " Q_H " in Figure 1B and the equation " $Q_H = Q_H - W_c$ " in Figure 1C. However, Applicants have reviewed the Drawings and the term " O_c " does not appear in any of Figures 1-5. Applicants respectfully request the Examiner to reconsider and withdraw this objection. If the Examiner wishes to maintain this objection, Applicants respectfully request the Examiner to point out in which figure the term " O_c " appears.

In view of the foregoing, Applicants submit that claims 1 and 3-27, all of the claims presently pending in the application, are patentably distinct over the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephonic or personal interview.

Serial No. 10/680,233
Docket No. YOR920030264US1
YOR.477

15

The Commissioner is hereby authorized to charge any deficiency in fees or to credit any overpayment in fees to Assignee's Deposit Account No. 50-0510.

Date: January 14, 2005

Respectfully Submitted,



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Serial No. 10/680,233
Docket No. YOR920030264US1
YOR.477

7

AMENDMENTS TO THE DRAWINGS:

The attached sheets of drawings include changes to Figures 1B and 1C to overcome the Examiner's objections by deleting the term " Q_H " in Figure 1B and the equation " $Q_H=Q_H-W_c$ " in Figure 1C. These sheets which include Figures 1B and 1C replace the original sheet which included Figures 1B and 1C.

Attachments: Replacement Sheets

Annotated Sheets Showing Changes

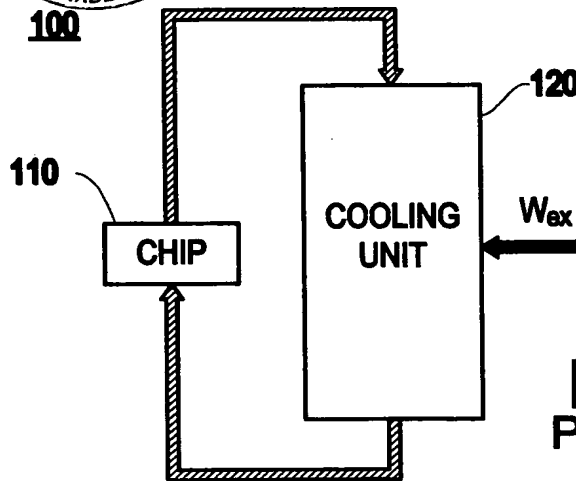


FIG. 1A
PRIOR ART

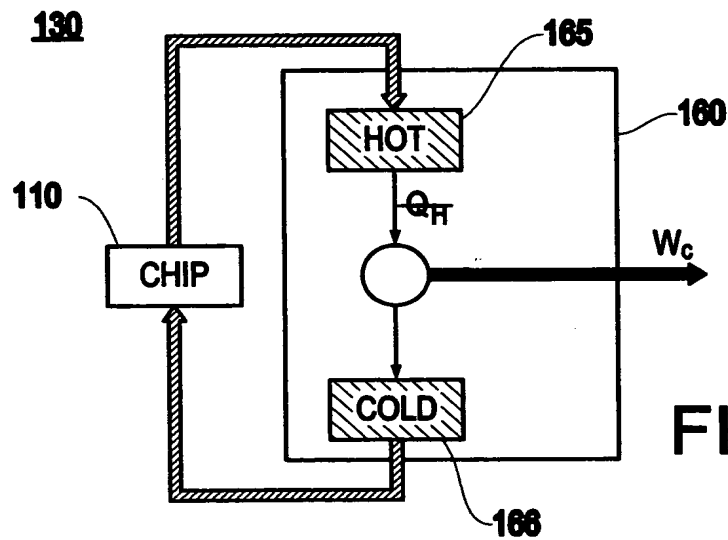


FIG. 1B

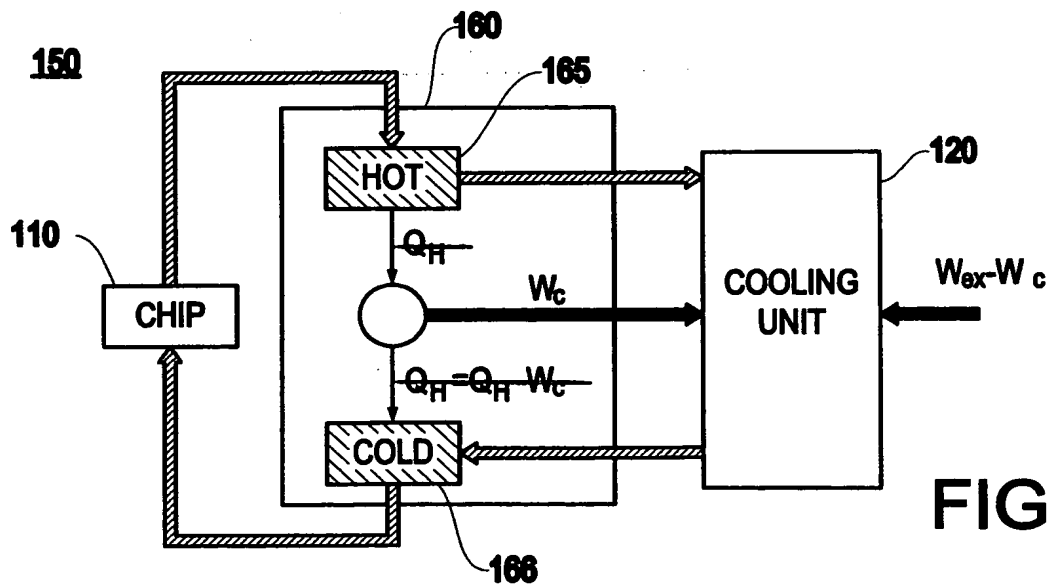


FIG. 1C